*Trends in Biosciences 13(9), Print : ISSN 0974-8431, 549-554, 2020*

# Effect of Variability in Genotypes on Major Insect Pests of Green Gram

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## ABSTRACT

**A field experiment was conducted at Regional Research Station, Anand to investigate the variability and resistance against pests on different green gram genotype during *kharif* 2017. Results revealed that the genotype ANDGG-13-01 was produced maximum number of pods per plant (37.15) along with maximum grain yield (1380 kg per hector), maximum plant height (56.41 cm) and branches per plant (3.85) where as NKM -15-08 found maximum pod length (8.48 cm) and 100 seed weight (4.44g). SKNM -14-01 genotype found very early physical maturity (89.25 days) with minimum days to 50 per cent flowering (39.00 days). Consideration of insect pests NKM 15-08 genotype was found minimum thrips (1.35 thrips per leaf) and whitefly population (2.85 whitefly per leaf) while minimum jassid population (0.04 per leaf) in GM 4 genotype. SKNM -12-06 had less number of bugs population (0.14 bug per leaf). The spotted pod borer *Maruca vitrata* minimum larval damage was observed in NKM 15-08 genotype. Comparatively less mosaic incidence (1.16 per cent) was observed in NKM 15-08. The based on present studies ANDGG-13-01 and NKM -15-08 and SKNM -12-06 can be used for further breeding study regarding yield improvement.**

**Keyword** *green gram, variability, insect pests, yellow mosaic virus*

Green gram is also known as mungbean, golden gram, oregeon pea, chikasano pea, chiroko and simply mung (Akpapunam, 1996). Greengram crop originated from India. At 1440 and 1660 BC, carbonised grains of greengram are found in archaeological sites of Navdatoli-Maheshwar (Madhypradesh, India) (Shaw, 2016). Green gram is short duration and highly nutritive crop thus it has spread to South and East Asia, East and Central Africa, the West Indies and the United States.

India is the largest producer and consumer of pulses in the world account for 33 per cent of world's area and 24 per cent of world's production. Green gram is one of the thirteen food legumes grown in India after chickpea, and pigeon pea.

A huge amount of diversity is present in mungbean which was collected and maintained at The World Vegetable Centre, Taiwan. The materials from India and West Asia are important sources of genetic variation for mungbean breeding, sharing about 74.9% of the total germplasm collected (Yimram *et al.*, 2009). Biswas & Bhadra (1997) studied green gram lines for variation in pod characters and divided them into four groups for pod length, indicating wide genetic variations. Greengram different genotype variability studies conducted by Gul *et. al.* (2007) found different genotype has different variable character on terms of leaves, seeds per pod, pod length, 100 seeds weight and seeds yield. Variability in genotype is important for new variety and hybrids developments. Although, insect pests and disease attack from seedling to harvesting stage which is detrimental factor for production and causing severe yield losses which is impact on development of variety and hybrids. The most serious insect pests attacking on green gram includes sucking pests like whitefly, jassid, bean thrips, gram pod borer (*Helicoverpa armigera*) and legume spotted pod borer (*Maruca vitrata*) (Kooner *et. al.*, 2006) Sandhy *et. al.* (2014) found that no genotype found resistant to *M. vitrata* infestation, it was range between 3.5 per cent to 68.39 per cent pod damage. The sucking pests like thrips and whiteflies acts as vectors for viral diseases such as leaf curl and yellow mosaic virus disease (YMV), respectively. The avoidable losses due to pest complex on different varieties of mungbean ranged from 27.03 to 38.06% (Duraimurugan & Tyagi, 2014).

Hence, the present study was made to estimate variability among 6 mungbean genotypes and screen against insect pest to identify the better performing genotype under the climatic condition of Anand.

## MATERIAL AND METHODS

The present study was conducted during summer season year of 2017-18 at Regional Research Station, Anand Agricultural University, Anand. The field experiment was laid out in a randomized block design (RBD) and the consist 6 genotype and these treatments were four time replicated. Greengram genotype grown in plots have 5 rows, plot size 5.0 x 3.6 meter in each plot. The plant space between rows and plants were maintained 45 cm and 10 cm, respectively. Crop was raised by following all local recommended agronomical practice except insecticidal spray.

To record the data on quantitative traits *viz.* days to 50% flowering, plant height, number of primary branches per plant, number of pods per plant, pod length, number of seeds per pod, days to physiological maturity, 100 seed weight of total five plants were randomly selected. The data were subjected to analysis of variance.

For the count of aphid, jassid and whitefly population, 5 plants randomly selected in net plot area of each treatment. The population jassid and whitefly will be recorded from three leaves (upper, middle and lower) of the selected plants. The data from each plot will be recorded early in the morning at every week after 10 days of sowing up to 60 days after sowing for sucking pest. The observations were recorded on the number of larvae per plant at every week after 10 days of sowing up to 60 days after sowing from randomly selected 5 plants per plot.

The data was analyzed for analysis of variance to determine the significance of treatments (Steel & Torrie, 1980). Means were separated by Duncan's New Multiple Range Test (DMRT) (Duncan, 1955).

## RESULTS AND DISCUSSION

Experimental plot was good and excellent conditions. All quantitative parameter was found significant difference among tested genotype except seeds per pods (Table 1).

Analysis of variance revealed that significant minimum days to 50 per cent flowering was observed in genotype SKNM-14-01 (39 days) followed by GM-4 (40.50 days) and NKM-25 (41.25 days). Variability in days to 50% flowering is also reported by several previous workers *i.e.* Reddy *et al.* (2003), Siddique *et al.* (2006). Among different genotype maximum plant height was observed in ANDGG-13-01 (56.41 cm) followed by SKNM -14-01 (49.69 cm), Meha (49.40 cm), SKNM-12-06 (47.75 cm) and NKM (46.17 cm). These result accordance to previous reported by Sarkar & Kundagrami (2016), Mehandi *et al.* (2013) and Rohman *et al.* (2003). All genotype between maximum branches per plant was observed in ANDGG-13-01 (3.85) which was at par with Meha (3.70), GM-4 (3.55) and NKM-15-08 (3.40). These results are confirmed by the study of Yaqoob *et al.*,(1997) who reported significant differences among genotypes for branches per plant.

Pods per plant ranged between 22.95 and 37.15. The significantly maximum number of pods per plant was observed in ANDGG-13-01 (37.15) followed by NKM-15-08 (32.45) besides maximum pod length was observed in NKM-15-08 (8.48 cm) followed by SKNM 14-01 (7.81 cm). The seed per pod was found non-significant difference among all tested genotype. The present study confirms by Rahman and Hussain (2003) reported that pods per plant had significant differences among the genotypes. The significant differences were observed for pod length among the genotypes which is supported by the study of Kumhar & Chaudhary (2007) who reported significant differences for pod length.

The significantly highest 100 seed weight was observed in NKM-15-08 (4.44 g) it was at par with SKNM 14-01 (4.24 g) and GM-4 (4.15 g). These results are in accordance with those of Rahim *et al.* (2010) who also reported significant differences among various genotypes for 100-seed weight. The significantly minimum days to physiological maturity

**Table 1: Mean performance of greengram genotypes for quantitative characters**

| Sr No. | Variety | Days to 50% flowering | Plant Height (cm) | Branches per Plant | Pods per Plant | Pod Length (cm) | Seeds per Pod | 100 Seed Weight (g) | Days to Physiologica l Maturity | Grain Yield (kg/ha) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | GM 4 | 40.50b | 41.07c | 3.55ab | 22.95e | 7.28c | 9.90 | 4.15a | 90.25a | 461e |
| 2 | Meha | 42.50c | 49.40b | 3.70ab | 25.65de | 6.86de | 9.90 | 3.43b | 92.50b | 1168b |
| 3 | SKNM-14-01 | 39.00a | 49.69b | 3.20bc | 30.15bc | 7.81b | 10.55 | 4.24a | 89.25a | 932c |
| 4 | SKNM-12-06 | 42.00c | 47.75b | 2.90c | 26.85cd | 6.63e | 9.85 | 3.56b | 92.00b | 726d |
| 5 | NKM-15-08 | 41.25bc | 46.17bc | 3.40abc | 32.45b | 8.48a | 11.20 | 4.44a | 90.00a | 812cd |
| 6 | ANDGG-13-01 | 45.00d | 56.41a | 3.85a | 37.15a | 7.16cd | 10.70 | 3.29b | 95.25c | 1380a |
| Sem ± | | 0.46 | 1.74 | 0.17 | 1.17 | 0.14 | NS | 0.12 | 0.42 | 63.51 |
| C.D. at 5% | | 1.40 | 5.25 | 0.53 | 3.53 | 0.41 | NS | 0.36 | 1.26 | 191.43 |
| C.V. % | | 2.23 | 7.19 | 10.18 | 8.03 | 3.71 | 6.32 | 6.20 | 0.91 | 13.91 |

was observed in SKNM 14-01 (89.25 days) which was at par with NKM-15-08 (90 days) and GM 4 (90.25 days). The significantly highest yield was observed in ANDGG 13-01 (1380 kg/ha) it was at par with Meha (1168 kg/ha). Lowest yield was observed in GM-4 (461 kh/ha). These results are in close approve by Siddique *et al.* (2006) and Begum *et al.*, (2012) founded variability grain maturity and grain yield in different genotype.

**Variability on genotype impact on pests**

Under the experiment 6 genotypes of mungbean also screened against insect pest *viz.* jassid, thrips, whitefly and pod borer and viral disease *viz.* Yellow mosaic virus data were presented in Table 1. Based on insect count on genotypes, it was found that the significantly minimum thrips population was observed in NKM 15-08 (1.35 per leaf) genotype followed by SKNM 12-06 (2.00 thrips per leaf), ANDGC-13-1 (2.06 thrips per leaf) and Meha (1.79 thris per leaf). The maximum thrips population was observed in GM-4 (2.88 thrips per leaf). Variation on thrips population due to different genotypes also reported by Singh & Singh (2014) that was minimum infestation was found in ML-1628, followed by Pusa-1171, ML- 1464 and maximum in BPMR-145, followed by HUM-12 and Pusa-0672.

The significantly minimum whitefly population was found in genotype NKM-15-08 (2.35 whitefly per leaf) which was at par with ANDGC-13-1 (2.85 whitefly per leaf). The next best genotype was observed minimum whitefly population in SKNM 12-06 (3.06 whitefly per leaf) followed by SKNM 14-01 (3.60 whitefly per leaf) and meha (3.79 whitefly per leaf). Maximum whitefly population was observed in GM-4 (3.94 whitefly per leaf). Variation on incidence of whitefly against different genotype confirm by various reports *viz.* Singh & Singh (2014), Kumar *et al.* (2019) and Khaliq *et al.* (2017).

The significantly lowest jassid population was observed in GM-4 (0.04 jassid per leaf) it was at par with SKNM 14-01 (0.06 jassid per leaf) and SKNM 12-06 (0.06 jassid per leaf). The maximum jassid population was observed in ANDGC 13-1 (0.21 jassid per leaf) and meha (0.21 jassid per leaf). Present finding was also confirm by Singh & Singh (2014).

Bug population was also found low in experiment although variation on genotype was observed. The significantly minimum population was observed in SKNM 15-06 (0.14 bugs per plant) which was at par with GM-4 (0.28 bugs per plant). Maximum bug population was found in meha (0.33 bugs per plant).

**Table 2: Incidence of pests on different genotype of mungbean**

| Entry | No. of insects per leaf | | | | No. of larva* per plant | Mosaic incidence* (Per cent) |
|---|---|---|---|---|---|---|
| | Thrips | Whitefly | Jassid | Bugs | | |
| SKNM-14-01 | 2.48 (1.72)cd | 3.60 (2.02)cd | 0.06 (0.75)a | 0.17 (0.82)ab | 0.31 (0.90)ab | 43.83 (41.44)d |
| SKNM-12-06 | 2.00 (1.58)b | 3.06 (1.89)bc | 0.08 (0.76)a | 0.14 (0.80)a | 0.25 (0.87)ab | 57.18 (49.15)e |
| NKM-15-08 | 1.35 (1.36)a | 2.35 (1.69)a | 0.21 (0.84)b | 0.31 (0.90)c | 0.19 (0.83)a | 1.16 (4.32)a |
| ANDGC-13-1 | 2.06 (1.60)bc | 2.85 (1.83)ab | 0.21 (0.84)b | 0.17 (0.82)ab | 0.29 (0.89)ab | 31.59 (34.13)c |
| GM4 | 2.88 (1.84)d | 3.94 (2.11)d | 0.04 (0.74)a | 0.28 (0.88)bc | 0.35 (0.92)b | 100.00 (90.00)f |
| Meha | 1.79 (1.51)b | 3.79 (2.07)d | 0.21 (0.84)b | 0.33 (0.91)c | 0.23 (0.85)ab | 7.82 (16.16)b |
| SEm ± T | 0.05 | 0.05 | 0.03 | 0.03 | 0.03 | 1.40 |
| P | 0.02 | 0.03 | 0.01 | 0.01 | 0.01 | |
| T x P | 0.10 | 0.11 | 0.06 | 0.05 | 0.06 | |
| CD (.05) T | 0.14 | 0.15 | 0.08 | 0.08 | 0.08 | 4.22 |
| P | 0.07 | 0.08 | NS | NS | NS | |
| T x P | 0.27 | 0.30 | NS | NS | NS | |
| CV % | 12.25 | 13.89 | 14.79 | 12.72 | 13.51 | 7.14 |

Note: Figures in parentheses are square root (v(x+0.5) transform value those outside are original

Treatment mean with letter(s) in common are non-significant by DMRT at 5 % level of significant

* Spotted pod borer larva

**Mosaic incidence was at the 75 DAS

Kumar & Singh (2017) was reported that maximum pod bugs on genotype LGG 460 (3.15 pod bugs/5 plant) and minimum in genotype PM 10-18 (1.38 pod bugs/5 plant).

Spotted pod borer larval was found significantly low in NKM 15-08 (0.19 larva per plant) which was at par with meha (0.23 larva per plant) and SKNM 14-01 (0.31 per plant). The present finding accordance to the Kumar & Singh (2017) reported that genotype ML 2410 (3.38 larvae/5 plants) had maximum infestation and genotype PM 10-18 (1.13 larvae/5 plant) showed minimum infestation.

Yellow mosaic virus (YMV) incidence ranging from 1.16 per cent to 100 per cent. The significantly lowest YMV found in NKM 15-08 (1.16 per cent) followed by meha (16.16 per cent), ANDGC -13-1 (31.59 per cent), SKNM 14-01 (43.83 per cent), SKNM 12-06 (57.18 per cent). The highly susceptible

genotype was found GM-4 which was 100 per cent YMV incidence in experiment. Variation in yellow mosaic virus incidence in different genotype which was confirms by various report *viz.* Chandra *et al.* (2019), Khaliq *et al.* (2017), Suman *et al.* (2015) and Patel & Srivastava (1990).

## CONCLUSION

In nutshell, present study shown that the significant variations were observed for all breeding quantitative parameters except number of seeds per pods. Genotype ANDGG-13-01 was produced maximum number of pods per plant along with maximum grain yield, maximum plant height and branches per plant where as NKM -15-08 found maximum pod length and 100 seed weight. SKNM -14-01 genotype found very early physical maturity with minimum days to 50 per cent flowering. Consideration of insect pests, NKM 15-08 genotype was found minimum population of thrips and whitefly while minimum jassid population in GM 4 genotype. SKNM -12-06 had less number of bugs population. The minimum spotted pod borer larval damage was observed in NKM 15-08 genotype. Mosaic incidence was less observed in NKM 15-08. This excellent breeding quantitative characters bearing genotype may be used for subsequent breeding programmes to develop improved mungbean genotypes along with resistance against different pests.

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*Received on 10-04-2020 Accepted on 28-04-2020*